



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Personal Navigation and Reporting

Technology

The Personal Navigation and Reporting System (PNRS) is an integrated system consisting of GPS, a low-cost dead-reckoning navigator (DRN) and a heads-up map display. The GPS capability and the heads-up display are being developed by CECOM and Natick. PNRS focuses on the DRN and the integration of the DRN with the other components. The DRN components are being studied. Advances in digital compasses, digital altimeters, pedometers, low-cost inertial systems and other POS/NAV-related technology areas are being considered. The GPS, when accessible, provides the position and navigation data. The GPS information also is used to bind the DRN errors. When GPS is not accessible due to natural or man-made terrain features or to high power jamming, the DRN provides the position and navigation information. A reporting (position and status) capability is included in the development for command and control use and for friend/foe identification. The Personal Navigation and Reporting System is a Science and Technology Objective (STO), # IV.G.4. The PNRS development will be coordinated with CECOM, Natick and PM Soldier. The findings of the PNRS development will be transferred to PM Soldier in the form of specifications for a PNRS. Small Business Innovative Research (SBIR) contracts are being used to foster the development of additional sources for military/civilian POS/NAV developments.

Problem

Survivability, lethality, and autonomy are linked to the ability to rapidly move about the battlefield. This rapid movement is needed for all involved in the battle, be it a combat infantry or armor unit, an intelligence unit, medical unit, logistics unit, etc. POS/NAV systems, which cost less, require very low power and meet dismounted requirements are needed for personal navigation. Desert Shield Operations and Desert Storm demonstrated the value of the Global Positioning System (GPS) for navigation in the near-perfect environment, open desert terrain with no features obstructing the GPS user's view of the sky. A worldwide navigation capability must provide position and direction information in all types of terrain with natural and man-made features, which obstruct the GPS user's view of the sky.

Currently, the dismounted soldier has a GPS receiver, a map, a compass and the length of his pace as navigation tools. Using the map a route for a mission is planned based on the soldier interpretation of the terrain, identifiable waypoints, headings/distance to waypoints and the coordinates of the waypoints as scaled from a map. The waypoint coordinates are stored in the GPS receiver. During the execution of the mission, GPS provides the soldiers current position, distance to the next waypoint and direction to the waypoint. The compass is used to orient the soldier and to show the direction of march. When GPS is not available, the soldier continues to navigate using the compass, the distance between waypoints and the length of his pace. A soldier in the squad counts his paces and determines the distance traveled in the direction of the next waypoint. This is "dead reckoning" navigation. Obstacles, natural or man-made, impact navigation since the soldier must mentally adjust the distance to compensate for going around the obstacle.

Expected Cost To Implement

The product target is \$300 - \$500 each in quantities of 1000 units.

Benefits/Savings

The PNRS allows the whole squad to concentrate on the surrounding situation and not have to remember pace count or check direction. When obstacles are encountered, accurate navigation is continued without the burden of mentally adjusting distance traveled.

Status

A Phase II SBIR contract was awarded to Point Research Corp (PRC) . PRC developed a digital dead reckoning navigator, which PRC calls PointMan Dead Reckoning. PRC will integrate PointMan with a commercial GPS receiver, a small COTS radio and a small computer to form a concept demonstration PNRS. In June and July 1995, PRC successfully demonstrated the PNRS to Motorola, the Force XXI Land Warrior (FXXI LW) contractor, to the Dismount Battlespace Battle Lab (DBBL) and to the Director of TEC. In December 1995, the contract with PRC was modified to design, breadboard and test a FXXI LW size and form for PNRS hardware. TEC and PRC won the 1996 SBIR Phase II Quality Award. PRC is now under contract with Motorola to support the development of an Integrated Navigation (INAV) capability for FXXI LW. The PRC - Motorola contract constitutes the transfer of technology from the STO to FXXI LW and marks the successful end of the STO at the end of FY97. INAV successfully completed two User Assessments at DBBL, Fort Benning, Georgia. The INAV FXXI Proof-of-Concept Demo was held in March 1998 and INAV successfully completed the demo. Current work and testing focuses on accelerated integration of INAV into Land Warrior baseline systems.

ERDC POC

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Distribution Sources

The current version of PointMan Dead Reckoning Module is available from Point Research Corporation, 17150 Newhope Street, Suite 709, Fountain Valley, CA 92708. POC: Robert Levi, 714-557-6180

Available Documentation

Current information available from Point Research Corporation

Available Training

Current information available from Point Research Corporation

Available Support

Current information available from Point Research Corporation